

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 7 0										PAGE (3) 1 OF 0 6									
TITLE (4) Reactor Trip Due to Accidental Opening of Circuit Breaker																													
EVENT DATE (5)						LER NUMBER (6)						REPORT DATE (7)						OTHER FACILITIES INVOLVED (8)											
MONTH		DAY		YEAR		YEAR		SEQUENTIAL NUMBER		REVISION NUMBER		MONTH		DAY		YEAR		FACILITY NAMES						DOCKET NUMBER(S)					
0 8		1 2		8 6		8 6		0 1 6		0 0 0		9 1 1		8 6								0 5 0 0 0							
0 8		1 2		8 6		8 6		0 1 6		0 0 0		9 1 1		8 6								0 5 0 0 0							
OPERATING MODE (9) 1						THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																							
POWER LEVEL (10) 1 0 1 0						20.402(b)						20.406(c)						X 50.73(a)(2)(iv)						73.71(b)					
						20.406(a)(1)(i)						50.36(c)(1)						50.73(a)(2)(v)						73.71(c)					
						20.406(a)(1)(ii)						50.36(c)(2)						50.73(a)(2)(vi)						OTHER (Specify in Abstract below and in Text, NRC Form 366A)					
						20.406(a)(1)(iii)						50.73(a)(2)(i)						50.73(a)(2)(viii)(A)											
						20.406(a)(1)(iv)						50.73(a)(2)(ii)						50.73(a)(2)(viii)(B)											
20.406(a)(1)(v)						50.73(a)(2)(iii)						50.73(a)(2)(ix)																	
LICENSEE CONTACT FOR THIS LER (12)																													
NAME J. B. Day, Licensing																TELEPHONE NUMBER 710 14 3171 31-17 1013 13													
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																													
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC																			
X	B	K	F	S	V	V	0	3	0	Y																			
SUPPLEMENTAL REPORT EXPECTED (14)																EXPECTED SUBMISSION DATE (15)		MONTH		DAY		YEAR							
YES (If yes, complete EXPECTED SUBMISSION DATE)																X NO													

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On August 12, 1986, at approximately 1245, an individual accidentally bumped open the main supply breaker to a 125 VDC Vital Instrumentation and Control Power Distribution Center. This loss of power caused a Main Feedwater (CF) and Main Steam (SM) isolation. The CF pumps tripped on high discharge pressure causing a turbine trip which resulted in a reactor trip since reactor power was greater than 48%.

The loss of instrumentation and control power resulted in some loss of indication and equipment malfunction until power was restored. Operators were able to quickly stabilize the plant and restore power.

Protective covers will be installed over vulnerable breakers and abnormal equipment responses were investigated. This event is bounded by a "Turbine Trip" event in the FSAR Chapter Accident Analysis.

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APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

INTRODUCTION:

On August 12, 1986, at approximately 1245, an individual accidentally bumped open the main supply breaker to a 125 VDC Vital Instrumentation and Control Power [EIIS:EI] Distribution Center. This loss of power caused a Main Feedwater [SJ] (CF) and Main Steam [SB] (SM) isolation. The CF pumps tripped on high discharge pressure causing a turbine [TA] trip which resulted in a reactor trip since reactor power was above 48%. Operators implemented the Reactor Trip procedure. Operators secured from the Reactor Trip procedure and commenced reactor startup on August 13, 1986, at 0222.

Unit 2 was in Mode 1, Power Operation, at 100% power level at the time of this incident.

This incident is attributed to personnel error due to the individual accidentally bumping open the main supply breaker to 125 VDC Vital Instrumentation and Control Power Distribution Center EVDD.

EVALUATION:Background

The 125 VDC/120 VAC Vital Instrumentation and Control Power system provides a source of reliable continuous power for safety-related instrumentation and control required for startup, normal operation, and orderly shutdown of each unit.

The 125 VDC system is divided into four independent and physically separate load groups. Each load group is comprised of one battery, one battery charger, one DC distribution center, and two DC power panelboards.

The 120 VAC Vital Instrumentation and Control Power [EF] system receives its normal power from the 125 VDC Vital Instrumentation and Control Power system by means of separate inverters. A regulated power supply is provided for each unit as an alternate non-essential source for one AC vital load for a maximum of 24 hours per Technical Specifications (T.S.). This allows for uninterrupted manual transfer of power when an inverter is scheduled to be taken out of service for routine maintenance.

Description of Events

On August 12, 1986, two persons were replacing 1EKVD breaker 12, located in an electrical panel approximately 4 feet in front of the main supply breaker for distribution center EVDD. With the unit operational, the work was being performed on an energized circuit. The Specialist was assisting the Technician and was carefully observing the work to ensure personnel safety. The Specialist bent down to retrieve a tool and accidentally bumped open the main supply

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breaker to distribution center EVDD. The EVDD breaker has a paddle type handle which opens the breaker when pushed downward. The Unit 2 Alarm Summary Report indicated that the breaker opened at 1245:47. The Specialist informed appropriate plant personnel of the incident.

At 1245:48, SM and CF automatic isolation occurred due to the loss of distribution center EVDD and consequently both CF pumps tripped due to high discharge pressure. The main generator turbine tripped due to the loss of both CF pumps and a "Turbine Trip/Reactor Trip" occurred since the unit was above 48% power. Containment isolation valve 2RV-33B failed closed due to the loss of distribution center EVDD and stopped cooling water flow to the lower containment ventilation [BK] units. Also, Pressurizer heater group B tripped due to the loss of distribution center EVDD.

Operators implemented the Reactor Trip procedure. Motor Driven (M/D) Auxiliary M/D CA Feedwater [BA] (CA) pump 2A automatically started but M/D CA pump 2B did not automatically start due to the loss of distribution center EVDD. Turbine Driven (T/D) CA pump was then manually started. The Steam Generator (S/G) PORVs and the Condenser Steam Dump [SO] (SB) Valves were not available due to the loss of distribution center EVDD. At 1245:55, the S/G code safety relief valves began opening.

At approximately 1303, DC power was restored to distribution center EVDD and M/D CA pump 2B automatically started. Also, the S/G PORVs began opening when distribution center EVDD was energized. S/G D PORV, 2SV-1, cycled abnormally. Valve 2SV-1 cycled closed/not-closed below its open setpoint causing S/G D pressure and level, and Pressurizer pressure to oscillate. Power was restored to normal on AC power panelboard 2EKVD at approximately 1306. Operators then attempted to reopen valve 2RV-33B from the control room but were unsuccessful. All available lower containment and upper containment ventilation units were started. At approximately 1309, containment pressure reached a maximum value of approximately 0.4 psig. At approximately 1423, air was jumpered around the damaged control air solenoid valve on valve 2RV-33B and restored cooling water flow was restored to the lower containment ventilation units. The maximum lower containment temperature reached approximately 158 degrees-F.

Reactor Coolant [AB] (NC) pump 2C was secured at approximately 1428 due to indication of high vibration. Personnel investigated and found no apparent problems with NC pump 2C or associated vibration monitoring equipment. It is believed that the pump motor coils were distorting due to the high temperature of lower containment and causing vibration. At 1436, lower containment temperature had decreased to approximately 124 degrees-F. At approximately 1555, NC pump 2C was restarted and indications of high vibration were received.

On August 13, at 0222, Unit 2 entered Mode 2, Startup.

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Conclusion

125 VDC Vital Instrumentation and Control Power was lost to distribution center EVDD for approximately 18 minutes. Operators responded and safely stabilized the unit following the reactor trip. The personnel involved with the opening of the main supply breaker to distribution center EVDD informed operators of the incident.

Some plant equipment problems occurred during the transient. The most significant problem was the loss of cooling water to the lower containment ventilation units for approximately 1 hour and 40 minutes. A control air solenoid valve burned up when valve 2RV-33B failed closed. Operators were unable to reopen valve 2RV-33B from the control room and subsequently jumpered control air around the damaged solenoid valve. The damaged solenoid valve was replaced.

Due to a normally de-energized auxiliary relay in the RTB switchgear which energizes with a breaker trip to provide Events Recorder indication, the opening time of RTB was not recorded. This was due to the loss of vital bus EVDD. Subsequent testing by personnel of RTB verified it's proper operation. Also, the reactor trip breakers were manually exercised 8 seconds after the trip signal was received.

Following the restoration of power to distribution center EVDD, S/G D PORV, 2SV-1, cycled repeatedly below its open setpoint. This valve cycling caused swings in S/G D level and pressure, and Pressurizer pressure. The problem with valve 2SV-1 will be investigated.

Operators manually secured NC pump 2C due to indication of high vibration during the transient. NC pump 2C and the vibration monitor were checked by the personnel responsible for the equipment and no apparent problems were found. When lower containment temperature was reduced, NC pump 2C was restarted and no indications of high vibration were received. NC pump 2C motor is air cooled. It is believed that the motor coils were distorting due to the high lower containment temperature resulting in high vibration.

This incident is attributed to Personnel Error, due to the Specialist accidentally bumping open the main supply breaker to distribution center EVDD. Contributing circumstances were that the Specialist and the Technician were working on an energized circuit with limited space constraints at the time of the incident. In addition, the paddle type handle on the EVDD breaker is large and vulnerable to being bumped open.

A review of past incidents revealed that one other reportable incident (reactor trip, LER 370/85-26) occurred due to the accidental manipulation of a breaker. Therefore this incident is considered recurring.

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CORRECTIVE ACTIONS:

Immediate: Operators implemented the Reactor Trip procedure.

- Subsequent:
- 1) Power to distribution center EVDC was restored.
 - 2) Control air was jumpered around the damaged solenoid valve on valve 2RV-33B and lower containment temperature and pressure were reduced.
 - 3) NC pump 2C was secured due to high vibration indication.
 - 4) Personnel inspected NC pump 2C and associated vibration monitoring equipment and found no apparent problems.
 - 5) The damaged control air solenoid valve on valve 2RV-33B was replaced.
 - 6) A Station Problem Report (SPR) was submitted to initiate investigation of installing protective covers over vulnerable breakers.
 - 7) An SPR was submitted to initiate investigation of changing valve 2RV-33B from an air operated valve to an electrically operated valve.
 - 8) The 7 day surveillance test on the Solid State Protection System (SSPS) was performed.
- Planned:
- 1) Protective covers will be installed over vulnerable breakers where deemed necessary.
 - 2) The reason valve 2SV-1 cycled abnormally will be investigated.
 - 3) Personnel will balance NC pump 2C and ensure that a motor coil inspection is performed.
 - 4) The need to replace the air-operated valve, 2RV-33B, with an electrically operated valve will be evaluated.

SAFETY ANALYSIS:

This incident is bounded by a "Turbine Trip" event in the Accident Analysis of FSAR Chapter 15.

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Due to the arrangement of the Vital Instrumentation and Control Power System, Unit 1 would have been affected similarly to Unit 2 if it had been in service at the time of the event. The resulting transient is expected to have remained within the bounds of this safety analysis.

Increasing containment temperature and pressure resulted during the post trip transient due to the failure of valve 2RV-33B to reopen following restoration of power to distribution center EVDD. The maximum temperature attained was 158 degrees-F. Temperature at this level for extended periods of time can be a structural detriment to containment concrete. For the short period of high temperatures during this transient, only possible erratic instrument behavior and inhabitability of the containment environment are concerns. The maximum containment pressure of approximately 0.4 psig is not excessive. Containment Phase A Isolation would have occurred at 1 psig. Containment spray would have occurred at 3 psig.

The trip of the CF Pumps and the unavailability of CA Pump 2B are the only non-conservative aspects of this transient with respect to the analyzed scenario. However, due to the manual start of the turbine-driven CA Pump, the turbine trip did not present a hazard to the integrity of the Reactor Coolant or Main Steam system. The increasing containment temperature and pressure did not affect containment integrity.

Residual heat was removed by CA to the atmosphere through the S/G code safety valves until the control power was restored making the S/G PORV's available. Primary average temperature dropped post-trip and stabilized at 562 degrees-F until power was restored, then dropped to 560 degrees-F where it again stabilized. Pressurizer pressure and level responded as expected, pressure dropping to approximately 2060 psig before recovering, level initially dropping before stabilizing at approximately 28%, slightly above the target of 25%.

Steam pressure spiked after the trip, partially due to the main steam isolation, just above 1200 psig, the code safety valves opened to relieve pressure. Steam generator levels responded as expected under the conditions.

The health and safety of the public were not affected by this incident.

DUKE POWER COMPANY

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VICE PRESIDENT
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September 11, 1986

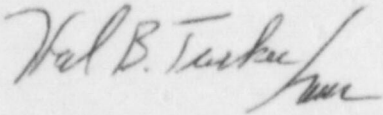
Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: McGuire Nuclear Station - Unit 2
Docket No. 50-370
LER 370/86-16

Gentlemen:

Pursuant to 10 CFR 50.73, attached is Licensee Event Report 370/86-16 concerning a reactor trip. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,



Hal B. Tucker

JBD/92/jgm

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